George James Snelus,

A.R.S.M., F.C.S., Memb. I.M.E. Metallurgist. Is distinguished as a chemist and metallurgical engineer. He was the first to make pure steel from phosphoric pig iron in a Bessemer converter lined with basic materials, a discovery of national importance, for which he was, in 1883, awarded the Bessemer Gold Medal of the Iron and Steel Institute. He has developed points of much scientific interest in connexion with the mode of existence of carbon and silicon in iron and steel, and has specially studied the liquidation of fluid bodies during the solidification of steel. He has also conducted important researches on the relation between the chemical composition and mechanical properties of steel used for rails. Is the author of the following papers:—"On the Condition of Carbon and Silicon in Iron and Steel"; "On the Composition of the Gases evolved from the Bessemer Converter"; "On the Scientific Features of the Danks' Puddling Furnace"; "On the Manufacture and Use of Spiegeleisen"; "On Fire-Clay and other Refractory Materials"; "On the Direct Process of Steel Making"; "On the Removal of Phosphorus and Sulphur in the Bessemer Process"; "On the Distribution of Elements in Steel Ingots"; "On the Chemical Composition and Testing of Steel Rails."

Thomas Lord Walsingham.

Trustee of the British Museum. A practical Entomologist and ardent student and collector of the Microlepidoptera, of which he has an extensive private collection. In 1872, Lord Walsingham made a special expedition to Northern California and Oregon, and besides forming a large series of the Microlepidoptera of that district, many of which were unknown, obtained a good collection of other Natural History specimens, which he presented to the Cambridge Museum.—[Addendum.—Author of "Catalogue of North American Tortricidæ in the British Museum," 4to., being Part 4 of "Illustrations of Typical Specimens of Lepidoptera Heterocera," 1879, and published by the Trustees. "On some Probable Causes of a Tendency to Melanic Variation in Lepidoptera of High Latitudes" (Presidential Address, Trans. Yorksh. Nat. Union, 1885); and various papers in the Trans. Ent. Soc. and Proc. Zool. Soc., 1880–84.]

William Whitaker, B.A. (Lond.),

F.G.S. Assoc. Inst. C.E. District Surveyor on the Geological Survey of England and Wales. Contributor to, or author of, ten of the Memoirs of the Geological Survey, among these being—"The Geology of the London Basin;" "The Geology of the N.W. part of Essex, and the Geology of the country round Ipswich;" of Papers in the Quarterly Journal of the Geological Society on the "Western end of the London Basin;" "The Lower Tertiaries of Kent;" "On some Borings in Kent, and other subjects;" and of many other papers on geology, more especially of the Cretaceous and Tertiary Beds, and on the subject of water-supply. Has also drawn up many lists valuable to the student of geological literature, and was for several years Editor of the *Geological Record*. Awarded the Murchison Medal of the Geological Society, 1886.

THE PARIS ASTRONOMICAL CONGRESS.

WE have now received a considerable instalment of the *procès-verbaux* of the sittings of the Conference, and although those of the final meeting are not yet to hand, we think it important to give, in continuation of our article in a recent number, an account of the work done, so far as the information has reached us, the Conference having sat every day, except Sunday, from the 16th to the 25th.

The meetings, which took place in the large hall of the Paris Observatory, were attended by the following astronomers and physicists, the names being given alphabetically:—Auwers, Berlin; Baillaud, Toulouse; Bakhuyzen, Leyden; Bertrand, Paris; Beuf, La Plata; Bouquet de la Grye, Paris; Brunner, Paris; Christie, Greenwich; Cloué, Paris; Common, Ealing; Cornu, Paris; Cruls, Brazil; Donner, Helsingfors; Dunér, Lund; Eder, Vienna; Elkin, America; Faye, Paris; Fizeau, Paris; Folie, Brussels; Gautier, Geneva; Gill, Cape of Good Hope; Gyldén, Stockholm; Hasselberg, Pulkova; Henry (Brothers), Paris; Janssen, Meudon; Kapteyn, Gröningen; Knobel, London; Krueger, Kiel; Laussedat, Paris; Liard, Paris; Lœwy, Paris; Lohse, Potsdam; Mouchez, Paris; Oom, Lisbon; Oudemans, Utrecht; Pechüle, Copenhagen; Perrier, Paris; Perry, Stonyhurst; Peters, Clinton; Pujazon, Cadiz; Rayet, Bordeaux; Roberts, Liverpool; Russel, Sydney; Schönfeld, Bonn; Steinheil, Munich; Struve, Pulkova; Tacchini, Rome; Tennant, Ealing; Thiele, Copenhagen; Tisserand, Paris; Trépied, Algiers; Vogel, Potsdam; Weiss, Vienna; Winterhalter, Washington; Wolf, Paris. With a few exceptions we have in this list all the men engaged in astronomical photography.

In our former article we gave an account of the first general meeting, held on April 16. The second took place on the 19th. The names of those present were as follow:—

President, M. Struve; Vice-President, Mr. Christie; Messrs. Auwers, Baillaud, Bakhuyzen, Beuf, Bigourdan, Bouquet de la Grye, Common, Cornu, Cruls, Donner, Dunér, Eder, Elkin, Fizeau, Gautier, Gill, Gyldén, Hasselberg, Paul Henry, Prosper Henry, Janssen, Kapteyn, Knobel, Krueger, Lœwy, Lohse, Mouchez, Oom, Oudemans, Pechüle, Perry, Peters, Pujazon, Rayet, Roberts, Russell, Schönfeld, Steinheil, Tacchini, Thiele, Tisserand, Trépied, Vogel, Weiss, Winterhalter, and Wolf.

M. Struve commenced the proceedings by giving an account of the resolutions adopted by a small technical Committee, which resolutions had been prepared by M. Lœwy. They had been suggested by the desire that a great number of Observatories should participate in the work; that the price of the instruments should be moderate; and that the work should be completed in the smallest time possible compatible with thoroughness.

The following conclusions of the Committee were adopted without discussion, and agreed to unanimously:—

(1) The instruments employed shall be exclusively refractors, and may be made locally provided the conditions laid down by the Conference are fulfilled.

(2) The stars shall be photographed as far as the fourteenth magnitude inclusively; this magnitude being indicated provisionally by the scale actually in use in France, and with the reservation that the photographic value shall be definitely fixed afterwards.

The third conclusion gave rise to a considerable amount of discussion, and was finally approved as follows:—

(3) The aperture of the object-glasses shall be 0·33 metre, and the focal length about 3·43 metres, so that a minute of arc shall be represented approximately by 0·001 metre.

The division of the Congress into sections for the study of special questions was next considered, and it was determined that there should be two sections, one to deal with purely astronomical questions, and the other with those involving photography.

It was arranged that these sections should not meet at the same time, and that each section should appoint its officers at the first meeting.

We next come to the work of the Photographic Section, which held two meetings on April 20 and 21.

M. Auwers, the Vice-President of the Conference, took the chair, and proposed that M. Janssen should be appointed President. This proposition was adopted with acclamation. The bureau of this section was composed as follows:—

President, M. Janssen; Secretaries, MM. Dunér and Trépied; and MM. Auwers, Bakhuyzen, Christie, Cloué, Common, Cornu, Cruls, Eder, Fizeau, P. Gautier, Gill, Hasselberg, Paul Henry, Prosper Henry, Kapteyn, Knobel, Krueger, Laussedat, Lœwy, Mouchez, Oudemans, Pechüle, Peters, Pujazon, Roberts, Steinheil, Tacchini, Thiele, Vogel, Weiss, Winterhalter, and Wolf.

The proceedings of the section were opened by M. Cornu in a long speech which gave rise to a very lengthened discussion.

The three following resolutions were finally arrived at:—

(1) All the plates to be used should be prepared according to an identical formula to be subsequently determined.

(2) A permanent control of these plates from a point of view of their relative sensibility to the different radiations shall be instituted.

(3) The aplanatism and achromatism of the object-glasses employed shall be calculated for the wave-lengths near Fraunhofer's G.

At the second meeting the last resolution was re-discussed, and another one was passed modifying it as follows:—

"The resolution adopted at the last meeting relating to the aplanatism and achromatism of the object-glasses shall be understood in the sense that the minimum focal distance shall be that of a ray near G with a view to obtain the maximum sensibility of the photographic plates."

An important letter was read from Mr. Vogel, the Director of the Potsdam Observatory, relating to the preparation of the plates and suggesting the construction of a sensitometer.

The Committee then passed on to consider the extent of the photographic field.

With regard to the question of the distortion of images of stars away from the centre of the field, the Astronomer-Royal gave the results of calculations which he had made to determine the dimensions of the elliptic images of stars at different distances from the centre of the field, supposing that at the centre the image is reduced to a point.

Calling the axes of the ellipses *a* and *b*, the Astronomer-Royal's results are as follows:—

Angular distance from the centre of the field.		*a.*		*b.*
°		″		″
0·0	...	0·0	...	0·0
0·5	...	3·0	...	1·3
1·0	...	11·0	...	5·0
1·5	...	24·0	...	11·0
2·0	...	44·0	...	20·0

The results of these calculations agree very satisfactorily with measurements actually made on some of the Brothers Henry's star photographs.

It was suggested that, by placing the centre of the plate slightly inside the focus, one might be able by a sort of compensation to diminish the distortions of the more distant parts of the field, and thus to augment the usable extent of field.

Finally, the following resolution was passed:—

"The object-glasses shall be constructed in such a manner that the field to be measured shall extend at least 1° from the centre."

The decision was almost unanimous, three only voting against it.

Dunér then raised the question of duplicating the observations on the same or different plates.

There was a unanimous feeling that, although more than 10,000 plates would be required if four square degrees of surface were agreed upon for the field, two series of negatives must be obtained for the whole heavens; the plates being so arranged that the star at the corner of one plate shall be at the centre of another.

The work of the meeting was terminated by suggesting the appointment of two special Commissions to consider questions relating to the safe keeping and reproduction of the negatives, and also to the determination of photographic magnitudes.

We next come to the meetings of the Astronomical Section, which met on April 20, 21, and 22.

The first part of the programme of this section was the examination of the methods and instrumental details which will enable the orientation of the plates and the value of the scale to be precisely determined. The question discussed was whether the actual plates recording the stars down to the fourteenth magnitude could be used for the determination of fundamental positions. It was ultimately determined to have two series of photographs, but no resolution was arrived at at the first meeting.

At the second meeting this matter was settled by the following resolution, which was carried unanimously, with one exception:—

"Besides the negatives giving the stars down to the fourteenth magnitude, another series should be made with shorter exposures, to assure a greater precision in the micrometrical measurement of the fundamental stars, and render possible the construction of a catalogue."

At the third meeting the President remarked that, as the section had finished its deliberations, it was desirable to arrive at final resolutions on the questions referred to it.

M. Auwers proposed the following resolution:—

"The supplementary negatives destined for the construction of the catalogue shall contain all the stars down to the eleventh magnitude inclusive. The Executive Committee shall determine the steps to be taken to insure that this condition is fulfilled."

This was carried by 25 votes to 6; some members being in favour of tenth magitude only.

The second resolution, which was unanimously agreed to, ran as follows:—

"The photographic plates to be used in formation of the catalogue shall be accompanied by all the data necessary to obtain the orientation and the value of its scale; and as far as possible these data shall be written on the plate itself.

"Each plate of this kind shall show a well centred copy of a system of cross-wires to insure the determination of errors of the field, and to eliminate those which may be produced by a subsequent deformation of the photographic film.

"Further details of this nature shall be determined by the Executive Committee."

The following resolutions were next carried:—

"In the negatives destined for the map the number of cross-wires to be used in their control and reduction shall be reduced to a minimum."

"The tubes of the photographic instruments shall be constructed of the metal most likely to give an invariable focal plane, and shall carry a graduation for the determination and regulation of the position of the plate."

"The Executive Committee shall choose the reference stars to be used."

"The question of the methods of measurement and the conversion of the numbers obtained in right ascension and declination for the equinox of 1900 is left to the Executive Committee."

"That Committee shall first occupy itself with the study, and methods of use, of measuring-instruments giving either rectangular or Polar co-ordinates, and based upon the simultaneous use of scales for the larger distances and micrometer eye-pieces for scale subdivisions."

Although we are unable to give, this week, a complete account of the final doings of the Conference, what was done at the last meeting is partly known, and it is clear that the Conference has been a great success, and that much solid work has been accomplished by the forty or fifty astronomers who attended one meeting or the other.

At the final general meeting Admiral Mouchez announced that all necessary arrangements had been made with the French Government to enable the Observatories of Paris, Algiers, Bordeaux, and Toulouse, to accept at once the conditions proposed by the Conference. M. Cruls, Director of the Rio Observatory, and M. Beuf, Director of the La Plata Observatory, also accepted at once the same conditions; their instruments being already ordered, and all expenses provided for. Most of the official astronomers had not as yet obtained the necessary grants of money from their respective Governments; but among those who expressed their readiness to take a share in the work, if funds can be provided, were Struve, of Pulkova; Weiss, of Vienna; Auwers, of Berlin; Christie, of Greenwich; Pujazon, of San Fernando; Oom, of Lisbon; Gill, of the Cape; and Russell, of Sydney, who answered also for Ellery, of Melbourne. Prof. Peters, speaking for the United States, said that ten of their Observatories were anxious to join in this undertaking, but he did not know whether they would accept the conditions proposed by the Conference. Omitting, therefore, these ten doubtful Observatories, we see that already four Observatories in the North and two in the South have given in their adhesion, and these will probably soon be joined by six other leading Observatories in the northern hemisphere and by three in the southern. Henceforward we need have no time or money spent on stellar photographs which will not find their place in a well-thought-out and general scheme.

The estimated cost for each Observatory, including instruments, extra assistant, plates, measurements, &c., is about £4000.

We believe that among the resolutions arrived at at the last meeting was one recommending the erection by France of an Observatory at Réunion, and by England of one in New Zealand.

The Permanent Committee appointed consists of all the Directors of the Observatories taking part in the work, with a certain number of members not necessarily actually engaged in this work. The names of the Committee are Christie, Dunér, Gill, Prosper Henry, Janssen, Lœwy, Pickering, Struve, Tacchini, Vogel, Weiss; and, as Directors of Observatories who have decided already to join, Cruls, Beuf, Mouchez, Trépied, Baillaud, and Rayet.

The Conference nominated Janssen and Common as a Committee to consider the application of photography to other celestial bodies not included in the scheme of a photographic chart.

The hospitality of the French Government and men of science to the members of the Conference can be judged from the following list of festivities provided in their honour. In addition to the welcome of the Conference by the Minister of Foreign Affairs already mentioned, Admiral Mouchez gave a *soirée* at the Observatory on Tuesday evening, April 19. The Bureau of the Conference were presented to the President of the Republic on Wednesday, the 20th. A banquet was given by the Minister of Foreign Affairs at his official residence, on Thursday, the 21st. M. Janssen invited the Conference to his Observatory at Meudon on Friday afternoon, the 22nd. On Saturday there was a ball at the Hôtel Continental and a special performance of "Hamlet" at the Comédie Française on Sunday. A banquet was given by Admiral Mouchez at the Observatory, on Sunday, to all the members of the Conference and many of the leading French *savants*, including MM. de Lesseps, Frémy, Becquerel, Hébert, and others. On Saturday, the 23rd, the English astronomers gave a dinner to their French *confrères*; the Astronomer-Royal presided, Mrs. Christie was also present.

ON ICE AND BRINES.[1]

II.

THE second part of the paper is occupied by the study of the melting of pure ice in sea-water and other saline solutions. A large number of experiments were made with solutions of concentration comparable with that of sea-water, and in one or two cases the experiments were extended to low temperatures and strong solutions. As a rule, from 50 to 100 grammes of solution, cooled to 0° C., were mixed with an equal weight of pounded ice, also at 0° C. The thermometer used for all these determinations was one of Geissler's normal ones, divided into tenths of a degree Centigrade; and its zero-point was verified almost daily. Along with the thermometer, a pipette of suitable capacity was immersed in the beaker, and used with the thermometer for keeping the mass well mixed. Its upper aperture was closed with a small cork, which was removed from time to time to permit of some of the brine being sucked up and allowed to run back again. The inside of the pipette was thus kept constantly moistened with the slowly altering solution in the beaker. The temperature was read after very thorough mixing and the sample thereupon immediately removed and preserved for analysis.

As a rule samples were taken for analysis at intervals of 0°·4 C. The results for three classes of salt in dilute solutions are arranged in Tables IV., V., and VI.

TABLE IV.—*Giving the percentage of chlorine in solutions of various chlorides in which ice melts at given temperatures.*

Temperature of melting ice.	Chloride in solution.						
	HCl.	NaCl.	KCl.	(Sea-Water.)	$MgCl_2$.	$CaCl_2$.	$BaCl_2$.
	Per cent. chlorine in solution.						
° C.							
−3·5	3·06	3·30	—	—	4·12	—	—
−3·0	2·68	3·02	3·00	—	3·62	3·70	—
−2·5	2·28	2·53	2·50	—	3·12	3·20	—
−2·0	1·85	2·02	2·00	—	2·62	2·70	2·72
−1·5	—	1·50	1·50	1·500	1·19	2·15	2·10
−1·0	—	1·02	1·02	1·034	1·51	1·50	1·47
−0·5	—	0·50	0·52	0·588	0·87	—	—

TABLE V.—*Giving percentage of K in solutions of various potassium salts in which ice melts at given temperatures.*

Temperature of melting ice.	Salt in Solution.			
	KCl.	KI.	$K\frac{Cl+I}{2}$	KOH.
	Per cent. K in Solution.			
°C.				
−3·0	3·29	3·02	3·15	—
−2·5	2·79	2·59	2·68	2·60
−2·0	2·28	2·13	2·17	2·08
−1·5	1·74	1·63	1·66	1·57
−1·0	1·18	1·13	1·12	—
−0·5	0·59	0·60	0·57	—

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[1] Paper read before the Royal Society of Edinburgh, by J. Y. Buchanan, on March 27 last. Continued from vol. xxxv. p. 611.